#53: Determining the Essential Features of an Exceptional Curvature-Sensing Amphipathic Helix

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Cellular function requires many processes that organize, deform and curve the membrane, including autophagy and endocytosis. Recently it has been shown that the membrane curvature alone is responsible as a regulator of activity and localization of proteins such as ArfGap1 and SpoVM. The small peptide SpoVM is responsible for beginning the process of coating the forespore in *Bacillus subtilis*, which it does by localizing exclusively to that slightly curved convex membrane structure. It is the first peptide found to recognize shallow curvature. Recently we have determined 3D structures of this 26 amino acid protein and one of its non-functional mutants. This has provided some structural and mechanistic insights into SpoVM's curvature sensing properties.

The SpoVM structure consists of 3-turn α-helix coupled to a flexible N-terminal loop, as compared to the standard straight helix of other curvature sensing helices. Additionally SpoVM's helix has an unbalanced non-polar face, with a very small polar side featuring only one charged residue. We have found that both the single charge, and relative length of helix and N-terminal tail play a loop in helping SpoVM localize to the correct subcellular location. We will present both in vivo and in vitro data demonstrating the impact of these features on the structure and function of SpoVM.